Sea Ice Outlook for September 2017
July Report - NASA Global Modeling and Assimilation Office

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Please note that these predictions are experimental and are produced for research purposes only. Use of these forecasts for purposes other than research is not recommended.

1. What is the type of your Outlook projection?
Dynamical Model

2. a) Pan-Arctic extent: 4.90 ± 0.34 million km^2
b) Pan-Antarctic: N/A
c) Alaska Region: 0.90 ± 0.25 million km^2; reference area: 4.00 million km^2

3. Contributor: NASA Global Modeling and Assimilation Office (NASA GMAO).

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4. We will likely not submit a prediction for August.

5. An experiment of the GMAO seasonal forecasting system using CryoSat-2 derived ice thickness predicts a September average Arctic ice extent of 4.90 ± 0.34 million km^2. The test examines the application of ice thickness data in a near-real time setting for the seasonal forecast system.

6. Brief explanation of Outlook method

The GMAO seasonal forecast is produced from coupled model integrations that are initialized every five days, with seven additional ensemble members generated by coupled model breeding and initialized on the date closest to the beginning of the month. The main components of the AOGCM are the GEOS atmospheric model, the MOM4 ocean model, and CICE sea ice model. Daily CryoSat-2 derived ice thickness observations from 1-January through 1-April were inserted into the GMAO Ocean Data Assimilation System (ODAS) based on the model background ice thickness distribution. The forecast model was initialized from five restarts

dropped from the ODAS system over the April and May period. Forecast fields were re-gridded to the passive microwave grid for averaging.

7. Dataset of initial sea ice concentration:
NASA Team for 01-Apr, 16-Apr, 01-May, 16-May, and 31-May 2017.
8. Dataset of initial sea ice thickness used: model-derived.
GMAO ODAS ice thickness integrated using CryoSat-2 derived daily ice thickness inserted over the period 1-January to 1-April, obtained from the Goddard Cryospheric Sciences Laboratory (Kurtz et al., 2014).
9. Model Name: Goddard Earth Observing System Model (GEOS).
Atmosphere: GEOS AGCM initialized with MERRA-2 and GMAO forward processing NWP analysis.
Ocean: MOM4 initialized with GMAO Ocean Data Assimilation System (LETKF).
Ice: CICE4 (LETKF).

10. If available from your method:

a) Uncertainty/probability estimate such as median, ranges, and/or standard deviations (specify what you are providing): Ensemble standard deviation: 0.34 million km^2

b) Brief explanation/assessment of basis for the uncertainty estimate (1-2 sentences).
The given uncertainty is the standard deviation of the 5 member ensemble.

c) Brief description of any post processing you have done (1-2 sentences).
The model output was re-gridded to the standard Northern Hemisphere passive microwave grid.

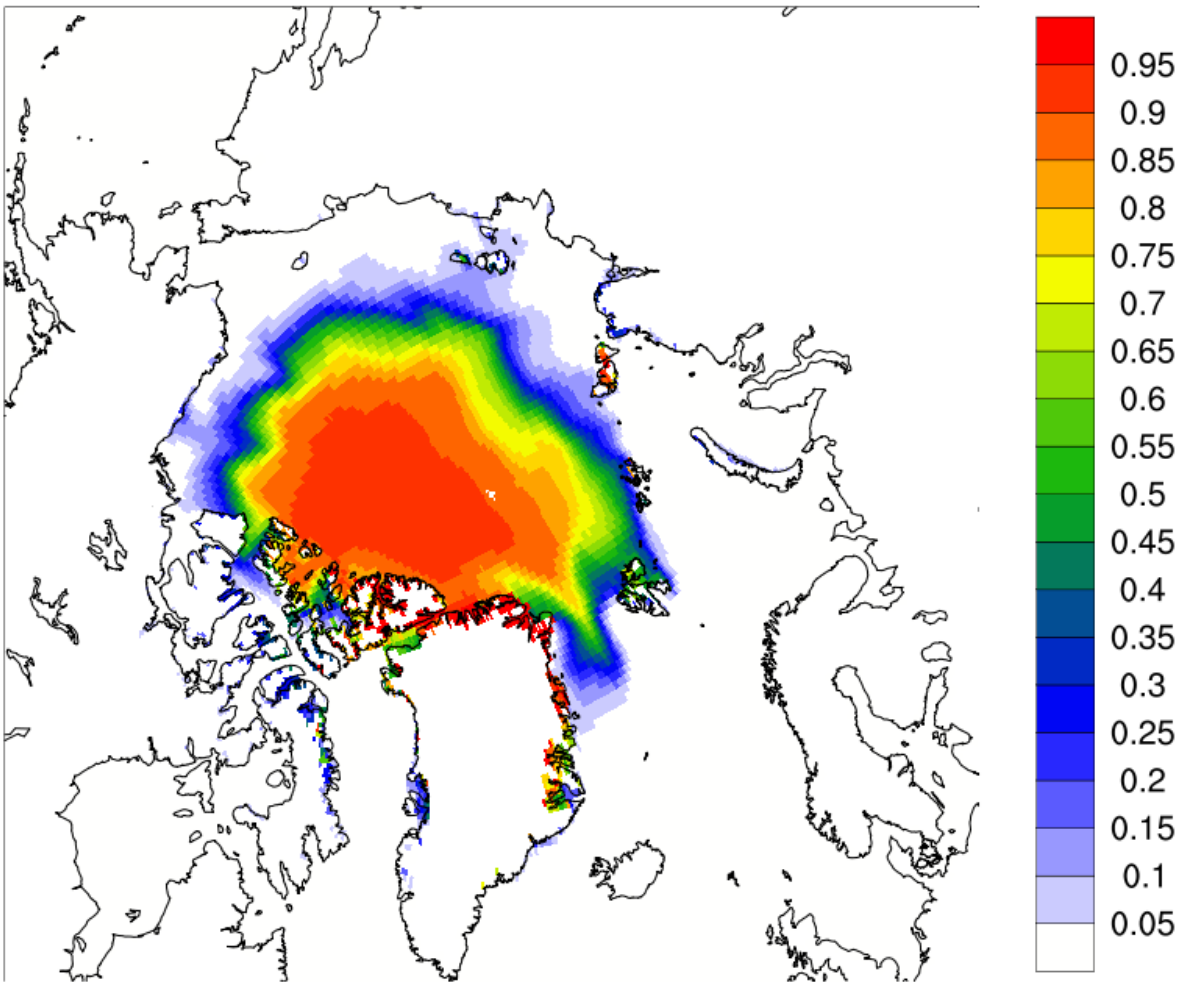

Figure 1. Ensemble-averaged sea ice concentration forecast for September 2017.

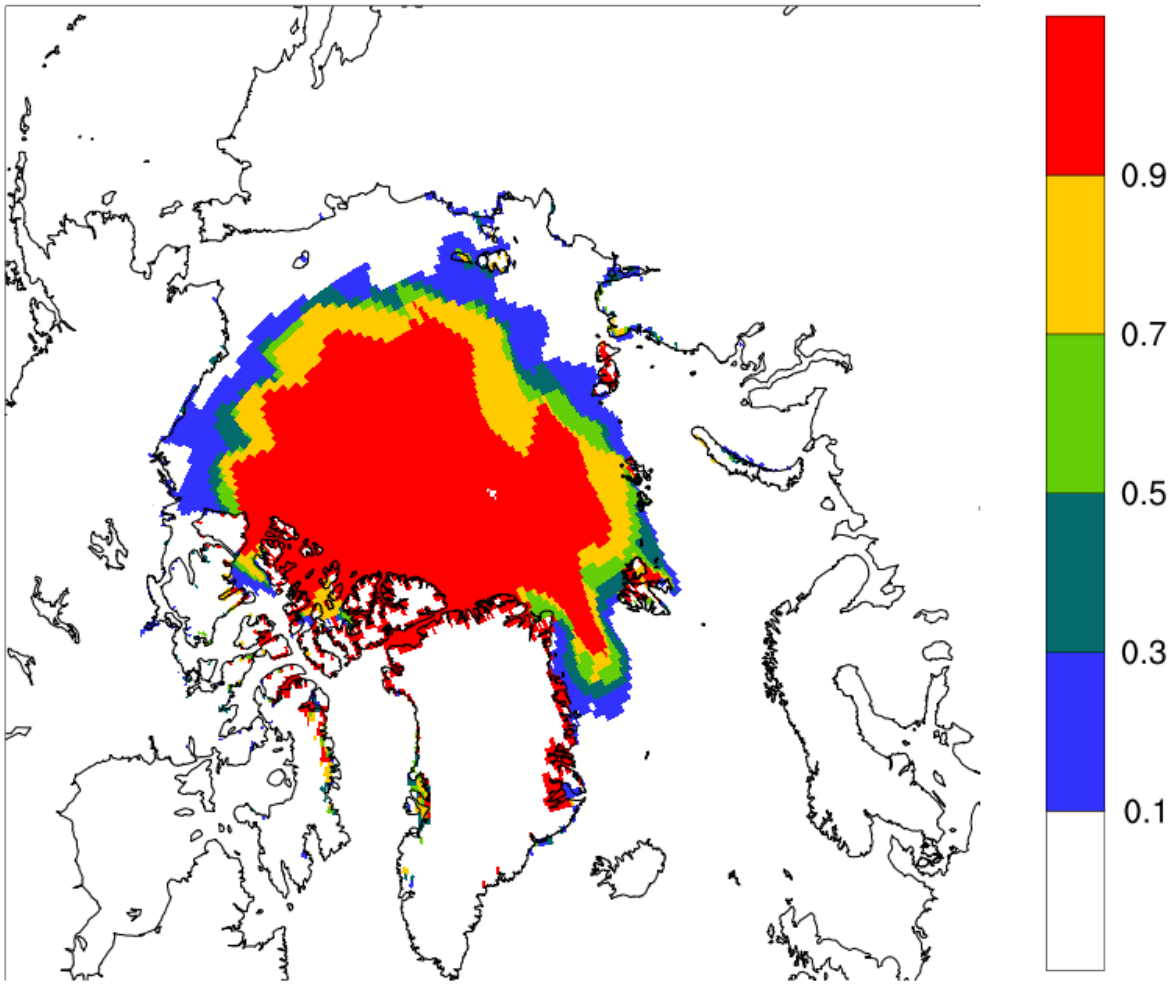

Figure 2. Ensemble probability of sea ice extent for September 2017.